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Nanotechnology-an overview

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ABSTRACT

Nanotechnology is an Interdisciplinary and integrates the science and technology. This technology is the materials at nanodimension. The approach at nanodimension towards manufacturing and fabrication will responds to the challenge for future competitiveness of much of the economy. Preparation of materials at nanodimension supports the growth of nanotechnology and which routes the nanotechnological applications. The emerging research materials are in the research stage and would be used in nanometer scale devices. Development of characterization technology is needed to understand the composition, structure, morphology and other requirements at nanodimension. This technology may be growing future and final technology and will be accessible out side the human regime.

KEYWORDS

Interdisciplinary;
Nanodimension;
Characterization;
Technology.

INTRODUCTION

various periods in the human history of civilization are named after the materials used. E.g. Stone Age, Bronze Age, Iron Age etc. presently it is the age of Nanomaterials. Nanotechnology constitutes the study of materials at nanodimensions[6]. This technology was coined by Nario Tanisguchi in 1974 to describe machinery with tolerance of less than a micron. The technology for nanoscale materials will increase standard of living. No ifs, and, or, buts. Done right, it will make over lives more secure, prove healthcare delivery and optimize our use of limited resources.

Technology for interdisciplinary science that brings mature technology called nanotechnology. Focusing on the nanoscale intersection of fields Physics, Biology, Chemistry, Engineering and more[8]. On the other hand, nanotechnology raises many of the same issues as with any introduction of new technology, including concerns about the toxicity and environmental impact of nanomaterials[2], Nanoscience is rapidly expanding in the field of science. Nanotechnology centre are popping up around the world due to rapid applications in all the fields of science and technology adopted for such nanoscience materials constituents a fascinating class of technology known as nanotechnology. Nanomaterials constitute most fascinating class of materials because of the particle size. Novel routes class for synthesis of nanomaterials is integral aspects of nanotechnology. The behavior of complex multimetal oxides depends on their stochiometry and may also be depends on oxygen vacancy concentration, thus consolable growth conditions will be critical for achieving reproducible materials properties and performance. The ability to fabricate new structure with these materials allowing atomic level control of composition and oxygen using different techniques may enable techniques of new device applications. Fabrications of devices with atomic or molecular scale precision catalyze the rapid development of nano electronics. Devices with minimum feature sizes less than 100 nanometer are is one billionth of a meter (10^{-9} m) and is the unit of length that is generally most appropriate for descriting the size of single molecule[5]. The nanoscale marks the nebulous boundary between the classical and quantum mechanical worlds. Thus nanotechnology promises to bring revolutionary capabilities in fabrication of nanomechanics, nanoelectronics[3] and other nanodevices will undoubtedly solve the unsolvable problems faced by mankind in the present days.

Nanotechnology is the heart of interdisciplinary science and technology. The preparation at nanolevel materials depends on the history of the preparative chemistry. Quantum mechanical i.e. physics gives a true picture. Other side engineers and doctors are directed towards application of materials at nanolevel. This directs the development of nanotechnology. Industries like hardware industries, materials manufacturing health care etc. contributing directly from nanotechnology icons advances and indirectly from advances made by fellow players in the nanofield. The wide spread discussion amongst researchers is nanotechnology, among the investment community and elsewhere. While there is certainly a degree of hyperbole in some of this enthusiasm, it is also no exaggeration to say that nanotechnology is disrupting the face of much of industries. It promises smaller, cheaper, higher and faster devices with great function amility, using fewer raw materials and consuming less energy. The collective term for a set of technologies, techniques and new approach by thinking in new ways in science and engineering explains nanotechnology. A technology at nanolevel of electronics and biotechnology has credited their own technological revolutions and improves the impact factor of nanotechnology. Nanotechnology approach towards manufacturing and fabrication will repairs the failure sectors, which collectively responds to the challenge for future competitive of much of the economy. The impact of nanotechnology is the faster advancement in various fields like pharmaceuticals, drug delivery, biocompatible materials catalyst, sensors, communication, and magnetic materials. Indeed, there is a growing application that it is difficult to find areas of manufacturing and industry where nanoscience and nanotechnology will not have an impact. Implement impact of nanotechnology is large that it is dangerous torely on definitions that could restrict thinking. It is the genetic technology looking at revolutionary subjects in the new ways.

New approaches for manufacturing at nanolevel are top down approach entitles the reducing size of smallest stretching towards the nanoscale. This approach is in the first instance more the domain of nanoengineering. The extension of top-down approach extends techniques such as electron beam lithography, borrowed from microelectronics, to create microelectromechanical systems (MEMS). Physical limits for this approach are that, as dimensions reach the atomic scale, the manufacturing process is trying to manipulate individual molecule. Force become significant and new paradigms have to come into play. Technique uses to manipulating individual atoms and molecules are bottom-up technique. This implies controlled or directed self assembly of atoms and molecules into nanostructure. It resembles more closely, the process of biology and chemistry where atoms and molecules come together to create structures such as crystals or living cells. Creation of living cell or a snowflake is nature's own nanotechnology at work. Multidisciplinary underlines the nanotechnology by top-down and bottom up. A distinctive feature of genuinely disruptive technologies is that they can have many different applications. Disruptive technologies are those that displace older technologies and enable radically new generations of existing products and process to take over. Disruptive technologies can also enable whose new class of products and markets no previously feasible.

The development of materials for emerging research logic and memory devices requires nanoscale metrologies to enable identification and orphism of critical physical and electrical properly of modeling and simulation of synthesis and materials properties. Since these emerging research materials are in the research stage and would be used in nanometer scale devices, the metrology needs are primary fundamental and detailed characterization. New characterization technology and understanding is needed for composition, structure, morphology and other requirements. Currently the most widely used approaches for materials involve surface morphological imaginary with limited chemical mapping. The techniques for characterization of nanomaterials includes X-rays diffraction, transmission electron microscopy, scanning electron microscopy, atomic force microscopy, scanning tunneling microscopy, Infrared spectroscopy, electron spectroscopy. These techniques may have value with other probe technology.

Currently, nanotechnology is at very infantile stage. However, one have the ability to organize matter on the atomic scale and there are already numerous products available as a direct result of our rapidly increasing ability to fabricate and characteristic feature size less than 100 nm. In the way immanent break through in computer science and medicine[4]. will be where the real potential of nanotechnology will be first achieved.

Nanotechnology may or may not be the final technology, the future may or may not lie in countless diamond speak. It is having rapid infrastructure and can self replicate. So, it moves physical manipulation into a new time scale microseconds instead of seconds. The products of this techonology are the point discussion of nanotechnology is to show that technologies are products of singularity with intelligence. The point discussion of nanotechnology is to show that technologies accessible outside the human regime [Bowman D, (2006)] are significantly more powerful than those peoples are accustomed to dealing with; they can bypass existing human infrastructure operate on timescales for quicker than human hands; and provide a substrate for thought tremendously faster than both existing human brains existing computer technology.

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